UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101



JUN 13 2011

Ms. Josephine Newton-Lund
SLOP/Hanley Area Project Manager
United States Army Corps of Engineers
Kansas City District
601 East 12th Street/CENWK-PM-ES
Kansas City, Missouri 64106

Re: EPA Comments on the Draft Final Decision Document, Hanley Area Operable Unit 1
St. Louis Ordnance Plant, St. Louis, Missouri

Dear Ms. Newton-Lund:

The U. S. Environmental Protection Agency has received the document entitled "Draft Final Decision Document, St. Louis Ordnance Plant, Former Hanley Area, St. Louis Missouri" by CH2MHill, the U.S. Army Corps of Engineers Kansas City District, U.S. Army Environmental Command and 88th Regional Support Command. This document was received on February 22, 2011.

The EPA makes the following general observations on the Draft Final Decision Document:

1. The vapor intrusion description as a common element under each alternative does not provide a clear evaluation and appears that more VI characterization is needed before making a decision. Section 2.9.2.2 states "Based on the uncertainty of indoor air risk, the vapor intrusion pathway will be further evaluated as part evaluated as part of the site remedy" and later states "Data collected as part of the remedial design may be used to adjust the remedial approach if appropriate." This section, along with section 2.12.2.3, does not follow the EPA's Guide to Preparing Superfund Proposed Plans, Records of Decision, other Remedy Selection Decision Documents and National Oil and the Hazardous Substances Pollution Contingency Plan. The NCP Section 300.430(5)(i) states: "To support the selection of a remedial action, all facts, analyses of fact and site specific policy determination considered in the course of carrying out activities in the section shall be document, as appropriate, in a record of decision, in levels of detail appropriate to the site situation..." The fourth bullet in section 6.1.1 of the ROD Guidance "(The ROD serves as:) A key communication tool for the public that explains the contamination problems the remedy seeks to address and the rationale for its selection." Therefore, the VI issue (if one exists) must be evaluated and documented as a decision to public and regulatory agencies. The EPA recommends the following:

    a. The VI evaluation discussions should reference the fall 2010 meeting between USACE, MDNR, USEPA and the other project stakeholders regarding further VI activities, including additional indoor air sampling and subslab sampling.

b. Based on the language of the NCP and the ROD guidance, the VI analysis and decision should be documented in separate ROD as another operable unit. Modify sections 2.9.2.2 and 2.12.2.3 to include this language.

c. If action is required, then remedial action objectives, an evaluation of alternatives based on the nine criteria specified in the ROD guidance, public participation and land use controls for VI will need to be discussed the modified ROD. Specifically, LUCs will need to cover the following:

   i. Risk exposure and reasonably anticipated land uses

   ii. Risks necessitating the LUCs

   iii. The logic behind selecting the LUCs

   iv. Add language on the duration of the LUC, such as "Land Use Controls will be maintained until the concentrations of the vapors or groundwater are at the levels to allow for unrestricted use and exposure."

   v. Include language that the Army is responsible for implementing, maintaining, reporting on and enforcing LUCs.

   vi. Language assuring responsibility of the LUCs, even through transfer, for example as "Although the Army may later transfer, these procedural responsibilities to another party by contact, property transfer agreement, or through other means, the Army shall retain ultimate responsibility for remedy integrity."

   vii. Assuring the LUCs are clear and enforcements in the modified ROD, using the following language "A LUC Implementation Plan will be prepared as the land use component of the Remedial Design/Remedial Action Work Plan. Within 90 days of ROD signature, the Army shall prepare and submit to MDNR for review and approval a LUC Implementation Plan that shall contain implementation and maintenance actions, including periodic inspections."

2. The city of St Louis Ordinance 66777 cannot stand alone as means to provide no remedial action objective for the restoring groundwater to drinking water standards. Determination of the groundwater potability must have supporting state regulations or a groundwater system assessment by the EPA. The EPA recommends the following:

   a. Include the memorandum enclosed in this letter as a reference to the decision document and include in Section 2.8 and Section 2.13.1 the assessment to classify groundwater as a Class IIIA groundwater system, meaning the groundwater is not a source of drinking water based on insufficient yield.

b. The groundwater classification should be verified by a drawdown and transmissivity tests on steady state monitoring wells and the classification needs to be reevaluated as part of the five-year review process.

3. The discussion of the LUCs needs to be expanded in Sections 1.4, 2.9.2.4 and 2.12.2.5 to address Comments 1.c.i through 1.c.vii for consistency with similar decision documents at the Department of Defense sites.

4. It does not appear that this document provides an adequate exit strategy for groundwater monitoring. For example, the text states that five-year reviews will be terminated once contaminants of concern are at or below the remediation goals, but it does not provide information such as the number of consecutive rounds of results less than or equal to the RGs are necessary. Is this an oversight or will these details be provided in a Remedial Action/Remedial Design document? Please clarify.

The EPA has the following specific comments:

5. Page 1-2, Section 1.4, Lines 15-20: The "Vapor intrusion evaluation" text needs to reference groundwater sampling per the Feasibility Study and other parts of this Decision Document.

6. Page 1-3, Section 1.6: As presented in other Decision Documents approved by EPA, please include a statement similar to the following: "Additional information about the site can be found in the Administrative Record file."

7. Page 1-3, Section 1.6: For each of the bulleted items, identify the applicable section, for example, baseline risk represented by the COCs (Section 2.7).

8. Page 1-4, Section 1.7: As presented in other Decision Documents approved by EPA, including a lead-in sentence to this section as follows: "The undersigned acknowledges approval of the Selected Remedy for the Former Hanley Area, St. Louis Ordnance Plant, St. Louis, Missouri."

9. Page 2-5, Section 2.2.2.2, Line 17: The text states that "The 2008 RI filled remaining data gaps and fully delineated the nature and extent of contamination at the site." The description of "fully delineated" is problematic and not entirely true. In fact, text on Page 2-18 admits that PCB-1260 was not completely vertically delineated. Please revise the text accordingly.

10. Page 2-5, Section 2.2.2.2, Lines 34-44: In which document/report will the PDI data be formally presented?

11. Page 2-6, Section 2.2.3, Paragraph 5: The number of loads of clean fill are referenced but the report does not indicate the volume of soil in cubic yards or other volume measurement.

12. Page 2-6, Section 2.2.3, Paragraph 5: This text is written as if there is uncertainty as to if Building 220 was demolished. Consider revising as follows: "As described in the June 2007 ..., Building 220 was demolished in March 2007."

13. Page 2-7, Section 2.3, last paragraph: Include the street address and zip code for the Julia Davis Branch Library.

14. Page 2-12, Section 2.5.3.1, Paragraph 7: On page 2-2, paragraph 1 (line 8), the location of the lead azide reactor was listed as unknown. This paragraph says that it was housed in Buildings 219E and 219F. If the location is known, the paragraph on page 2-2 should be changed.

15. Page 2-13, Section 2.5.3, Paragraph 2: Elevated chromium concentrations are indicated. Are these total chromium, chromium VI or chromium III?

16. Page 2-13, Section 2.5.3, Paragraph 6: In the final sentence of the paragraph, the text indicates that" lead concentration was dispersed below the screening level." What mechanism would be responsible for the decreased concentration in the soil? Dispersion would not be a major mechanism for contaminant transport since the medium is soil and not groundwater.

17. Page 2-13, Section 2.5.3. Paragraph 7: In the third line of the paragraph, consider adding "exceeding the screening level" after "selenium concentration.

18. Page 2-15, Section 2.5.3.2, Paragraph 1: Please add "collected at depths of" before "more than 2 feet ...." in line 1.

19. Page 2-15, Section 2.5.3, Paragraph 1: In line 6 and 7, the text states that the metals in the subsurface were determined to be naturally occurring. Please state the basis for this statement.

20. Page 2-15, Section 2.5.3, Paragraph 2: Were the arsenic, cadmium and lead detected in the groundwater measured as total or dissolved metals?

21. Page 2-16, Section 2.5.3, Paragraph 5: It is unclear why the model would not predict the plume length over time. This would be a crucial portion of the fate and transport of the contaminant plume.

22. Page 2-17, Section 2.5.3, Paragraph 2: Why were three release dates (1941, 1959 and 1979) modeled? Is there physical/chemical evidence or information about site history that suggest that the release could have occurred in one or more of these years?

23. Page 2-18, Section 2.5.3, Paragraph 1: Is there a map of the aquifer showing where the fine sediments are located? If so, does this coincide with the CT plume?

24. Page 2-18, Section 2.5.3.5: Please elaborate on the screening levels (or lack thereof) for the metals and explosives in the powder well sediment.

25. Page 2-21, Section 2.7.1.1, Paragraph 6: Lines 32 and 33 state that the HHRA was performed out of order from that presented in the RI work plan. Please explain why it was not performed in the order specified in the work plan.

26. Page 2-22, Section 2.7.1.1, Paragraph 2: In the third bullet point under "Groundwater," the third

bullet states that on-site groundwater samples were collected within 100 feet of Building 219G. In the next sentence, it states that one groundwater sample collected from MW-104 in 2006 was used in the evaluation. How many total samples were used to evaluate the groundwater exposure for on-site groundwater near Building 219G?

27. Page 2-23, Section 2.7.1.2, Paragraph 6: In the Soil and Groundwater Exposures in Deep Excavations bullet, it states that future maintenance and repairs would be conducted over a few days' time duration only so exposures are not expected to be significant and were not quantified. Is this assumption enough to close the exposure pathway? What happens if people are impacted during the time maintenance is conducted, which may, for weather or other reasons, take longer than the few days assumed.

28. Page 2-24, Section 2.7.1.2 Paragraph 2: Under the Soil Exposures by Future Trespassers scenario it is stated that the groundwater is too shallow to use the Johnson and Ettinger Model. What alternative method will be used to quantify the exposure if groundwater is less than five feet below ground surface?

29. Page 2-26, Section 2.7.1.5, Paragraph 6: In evaluating the VOCs in groundwater downgradient of former Building 230, it is stated that the groundwater is too shallow to use the Johnson and Ettinger Model. What alternative method will be used to quantify the exposure if groundwater is less than five feet below ground surface?

30. Page 2-27, Section 2.7.2, Paragraph 2: A study for chromium and vanadium in the eastern United States was used to determine a background concentration for the site. Was Missouri considered a part of the eastern United States in this study?

31. Page 2-27, Section 2.7.3, Paragraph 3: Lines 19 and 20 state that bioavailable forms of selenium are expected to be present. Is there data to show that these are present?

32. Page 2-27, Section 2.7.3, Paragraph 3: The final sentence of this paragraph states that average concentrations of lead, manganese and zinc exceeded Eco-SSLs only slightly. Can this exceedance be quantified?

33. Page 2-27, Section 2.7.3, Paragraph 4: The fact that the soil is disturbed does not necessarily imply that the risk to flora and fauna is negligible. The contaminants could be present in the disturbed soil and may be available to these organisms.

34. Page 2-28, Section 2.8, Paragraph 2: The third bullet point mentions the concentrations of various COCs in soil, but does not give a cleanup level for comparison with these concentrations. What are the risk-based cleanup levels for arsenic and Aroclor 1260?

35. Page 2-32, Section 2.9.3, Paragraph 2: How many years of O&M are used to estimate the cost?

36. Page 2-32, Section 2.9.4, Paragraph 1: In line 23, it states that the TTZ will be treated with a chemical reductant or oxidant. Consider changing this to state that it will be treated with a reductant since the next sentence states that chemical reduction was selected.

37. Page 2-32, Section 2.9.4, Paragraph 3: In the final sentence on this page, it states that two samples will be collected each day at various depths. How many depths will be sampled? Are there two samples per depth or two samples per day only with the depth of each sample varying?

38. Page 2-33, Section 2.9.4, Paragraph 1: Groundwater samples will be collected from the soil mixing area. How will groundwater monitoring wells be protected during the trenching operation?

39. Page 2-33, Section 2.9.4, Paragraph 2: How many years of O&M are used to estimate the cost?

40. Page 2-33, Section 2.9.5, Paragraph 1: In lines 13 and 14, it states that contaminated soil above and below the groundwater table will be excavated from the TTZ. How far below the water table will soil sample be collected? Are the soil conditions at the site amenable to collecting soil samples below the water table?

41. Page 2-33, Section 2.9.5, Paragraph 3: How many years of O&M are used to estimate the cost?

42. Page 2-36, Section 2.12.1, Paragraph 2: The final sentence indicates that Alternative 3 would move the contaminated media and Alternative 4 would reduce the toxicity, mobility and volume. If the proper reductant is used, the toxicity and mobility and volume of contaminated media should also be reduced since the chemical reduction technique should decrease the volume of groundwater with COC concentrations above the action levels.

43. Page 2-37, Section 2.12.2.2, Paragraph 1: What are the action levels for thallium, arsenic, lead and Aroclor 1260?

44. Page 2-38, Section 2.12.2.3, Paragraph 3: Who developed the screening levels for chloroform; naphthalene; 1,1,1,2-TeCA; and 1,1,2,2-TeCA?

45. Page 2-39, Section 2.12.2.4: How many groundwater monitoring wells were to be sampled for estimating the cost of the Plume C monitoring? How many years of monitoring were assumed to estimate the cost?

46. Table 2-1: The units for this table of mg/kg appear to be incorrect for the TCLP Threshold values that are presented. Please verify.

47. Table 2-2: Are the MSSLs at the EPA Region 6 screening levels? What about arsenic? Please identify the source of the screening values.

48. Table 2-2: Is the "certified" reporting limit listed in the Notes the same as the reporting limit provided in the table? If so, add "certified" to the Reporting Limits column to avoid confusion.

49. Data Tables (2-1 through 2-19): The data are collected over many years. Does comingling nonsynoptic data present a problem in the risk analysis? Some compounds may have changed concentration over time.

50. Data Tables (2-1 through 2-19): Some analytes are listed as "Not Reported." Were the samples analyzed for these compounds? If they were analyzed but not reported, please include an explanation.

51. Data Tables (2-1 through 2-19): There are inconsistencies in the notation for chemicals not detected (ND, U, <). Consider making all the notations for nondetect uniform in all tables. In some notations, the criterion for listing a compound as nondetect (below MDL, below RL) is not stated.

52. Table 2-15: There are no notes for this table explaining U and J, the "a" superscript and the meaning of shaded values.

53. Figure 2-4: Please add an explanation of the USCS classifications to the legend. Please include a notation for the screened intervals in the groundwater monitoring wells.

The EPA has the following administrative comments for the Draft Final Decision Document:

54. Page vii - The term O&M is not defined before it is first used as abbreviation on page 2-29.

55. Page 2-4, Section 2.2.2.2, Line 9: Add "aforementioned" between fill and data gaps.

56. Page 2-6, Section 2.2.4, Paragraph 2: The state (Illinois) should be placed after "Chicago" in line 23.

57. Page 2-8, Section 2.4, Paragraph 3: The city of St. Louis is referred to as "the City" later in this section. Consider adding it in Line 24 as "limits of the city of St. Louis (City)."

58. Page 2-9, Section 2.5, Paragraph 1: Consider changing line 2, first full sentence to "A significant elevation."

59. Page 2-15, Section 2.5.3.3, Paragraph 5: Change the word "registered a" in line 42 to "was analyzed to have a... "

60. Page 2-16, Section 2.5.3.3, Paragraph 4: Under "Plume A," reword the first sentence to read "Contaminants of concern in Plume A consist of PCE, TCE and cis-1,2-DCE."

61. Page 2-17, Section 2.5.3, Paragraph 1: Line 4 mentions that year 52 is 2011, which will be "another 3 years." The date of this document is 2011. Consider rephrasing this sentence.

62. Page 2-17, Section 2.5.3, Paragraph 3: In lines 16 and 17, it is unclear what the "industrial industry" is. Please clarify.

63. Page 2-17, Section 2.5.3, Paragraph 3: In line 21, consider changing it to "contributed to the vertical and lateral migration of the contaminant, but the leaks in the sewer system have not been..."

64. Page 2-20, Section 2.6, Paragraph 2: In line 16, consider changing "Zoning Department" to "City of St. Louis Zoning Department."

65. Page 2-27, Section 2.7.3, Paragraph 2: Line 14 should read "and vanadium in the eastern United States ..."

66. Page 2-30, Section 2.9.2, Paragraph 1: Change the first bullet point to "Soil and powder well sediment excavation and off-site disposal."

67. Page 2-32, Section 2.9.4, Paragraph 3: Reword the first sentence to read "In this alternative, a one-pass trenching machine method for soil mixing was assumed for cost estimating purposes."

68. Page 2-34, Section 2.10.3, Paragraph 1: Modify line 39 to read "of exposure. Under Alternative 1, the COCs would naturally attenuate, slowly decreasing COC mass, but the..."

69. Page 2-35, Section 2.10.4, Paragraph 1: Change the words "contaminated area" to COCs since these are what are being destroyed or removed.

70. Page 2-35, Section 2.10.8, Paragraph 1: Substitute "MDNR" for "The State" since this is the agency involved.

71. Page 2-37, Section 2.12.2.2, Paragraph 2: Change the second sentence to "Excavation will be performed using a backhoe."

72. Table 2-14: All compounds were analyzed. There is no need for the Not Analyzed note.

73. Table 2-16: There are no E qualified values. These notations should be removed from the notes section.

74. Table 2-17: There are no D or R qualified values. This notation should be removed from the notes section.

75. Table 2-19: There are no B qualified values. This notation should be removed from the notes section. For the SED-PW-22 sample, the 2,4,5-trinitrotoluene sample has a J notation but no value.

If you have questions, please contact me at (913) 551-7520.

Sincerely,

Matthew Jefferson
Remedial Project Manager
Missouri/Kansas Remedial Branch
Superfund Division

Enclosure

cc: Jesse Scott, MDNR
David Moore, 88th Regional Support Command
Tim Mott, EPA FFRRO (via email only)
Jonathan Harrington, USAEC (via email only)
Chris English, Tetra Tech, Inc. (via email only)
Filippe Cade, Professional Environmental Engineers, Inc. (via email only)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

JUN 13 2011

**MEMORANDUM**

**SUBJECT:** Groundwater Classification for the Hanley Area
St. Louis Ordnance Plant – Hanley Area Operable Unit

**FROM:** Matthew Jefferson, Remedial Project Manager
Missouri/Kansas Remedial Branch, Superfund Division 6/10/11

**THRU:** Bill Pedicino, Senior Hydrologist
Assessment & Monitoring Branch, Environmental Services Division 6-10-11

DeAndre Singletary, Chief 6/10/11
Missouri/Kansas Remedial Branch, Superfund Division

**TO:** Superfund Site File

The purpose of this memorandum is to assess and classify the groundwater for the Hanley Area located in the St. Louis Ordnance Plant Site (CERCLIS ID: MO8210022465). Through this assessment, it is determined that the groundwater is classified as a Class IIIA groundwater system, meaning groundwater is not a source of drinking water based on insufficient yield of the groundwater in the subsurface. Detailed analysis for the groundwater classification is described in the Groundwater Classification Analysis section of this memorandum.

The Hanley Area is a non-National Priority List Formerly Used Defense Site. The U.S. Army is committed to cleaning up the Hanley Area under the Comprehensive Environmental Response, Compensation and Liability Act and the National Oil and Hazardous Substances Pollution Contingency Plan under the oversight of the Missouri Department of Natural Resources. The MDNR is the lead regulatory agency and the U.S. Environmental Protection Agency is the supporting regulatory agency.

The assessment was requested in response to concerns with land use and institutional controls for the Army's Draft Final Decision Document (CH2MHill 2011). The EPA does not agree with the use of the St Louis City Ordnance 66777 as an assessment of the groundwater classification at the Hanley Area and recommends either using a state promulgated groundwater classification system or assessing the groundwater under the Guidelines for Groundwater Classification under the EPA Goundwater Protection Strategy (EPA 1986). After consulting with the MNDR, the state of Missouri did not have a groundwater classification system for the Hanley Area.

**Groundwater Classification Analysis**

Groundwater classification analysis is based on the Table 4-1 of the Guidelines for Groundwater Classification and groundwater data from CH2MHill during a sampling event in August 2010, attached

to the end of the memorandum. From the evaluation, it has been determined that the groundwater is classified as Class IIIA – Groundwater not a source of drinking water. The following is based on the process found in Table 4-1:

Step 1: Establish Classification Review Area (CRA) and collect preliminary information. Optional – Demonstrate subdivision(s) of the CRA.

Response to Step 1: The CRA is defined by the property boundaries of the Hanley Area, the areas defined by groundwater plumes A, B and C in the attachment at the end of the memorandum, and the residents to north of the Hanley Area along the northern side of Stratford Avenue and southern side of Henner Avenue bound by Goodfellow Boulevard to the west.

Step 2: Locate any ecologically vital area in the CRA. Does the CRA or appropriate subdivision overlap an ecologically vital area?

Response to Step 2: No, the CRA is located in the greater metropolitan area of St. Louis and zoned as Business/Industrial in the Hanley Area along the southern side of Stratford Avenue, Single Family Residential along the northern side of Stratford Avenue and the southern side of Henner Avenue, and Neighborhood Commercial along eastern side of Goodfellow Boulevard between Stratford and Henner (City of St. Louis 2011).

A "no" response for Step 2 proceeds to Step 4, according to the Guidelines for Groundwater Classification.

Step 4: Determine location of well(s) within the CRA or appropriate subdivision. Does the CRA or appropriate subdivision contain well(s) used for drinking water?

Response to Step 4: Refer to the map attached to the end the memorandum. The CRA contains only monitoring wells and there are no drinking water wells within the CRA.

A "no" response for Step 4 proceeds to Step 8.

Step 8A: Determine the location of the reservoirs within the CRA or appropriate subdivision. Does the CRA or appropriate subdivision contain reservoirs used for drinking water?

Response to Step 8A: There are no reservoirs identified within the CRA.

A "no" response for Step 8A proceeds to Step 9.

Step 9: Determine yield from the groundwater medium (total depth across CRA or appropriate subdivision). Can it yield 150 gallons per day to a well?

Response to Step 9: Monitoring wells were purged in August 2010 for groundwater samples. According to CH2MHill, none of the wells reached steady state during the purging period except well MW-114. The purging rates for these wells ranged from 0.033 to 0.053 gallons per minute or 48 to 76 gallons per day. Therefore, none of the monitoring wells in the CRA are capable of yielding 150 gallons per day, and the CRA is classified as a Class IIIA – Not a source of drinking water due to insufficient yield.

**Uncertainties and Assumptions**

There are some uncertainties that may change the classification of groundwater in the CRA:

The groundwater yield test was based on a single groundwater sampling event in August 2010. The yield should be confirmed by performing drawdown curves and transmissivity tests preferable on monitoring well MW-114, which was the only well during the August 2010 sampling exhibiting steady state conditions. The EPA recommends confirming this assessment during the Remedial Design/Remedial Action phase.

The CRA is based on knowledge and data of the soil and groundwater contaminant plume from the August 2010 sampling event and the Remedial Investigation (CH2MHill 2009). If additional contamination information is found or it is believed that groundwater plume has migrated beyond the CRA boundaries, then it is recommended this evaluation be reassessed. Reassessment of the groundwater classification should be integrated into the Hanley Area five-year review process.

**References**

CH2MHill, Inc. 2009. *Final Remedial Investigation, St. Louis Ordnance Plant Former Hanley Area, St. Louis, Missouri.*

CH2MHill, Inc. 2011. *Draft Final Decision Document, St. Louis Ordnance Plant Former Hanley Area, St. Louis, Missouri.* February.

The City of St. Louis Missouri Planning and Urban Design Agency. 2011. *City of St. Louis Zoning District Map.* http://stlcin.missouri.org/zoning/map.cfm

United States Environmental Protection Agency. 1986. *Guidelines for Groundwater Classification under the EPA Goundwater Protection Strategy.* Office of Groundwater Protection, Office of Water.

Attachments

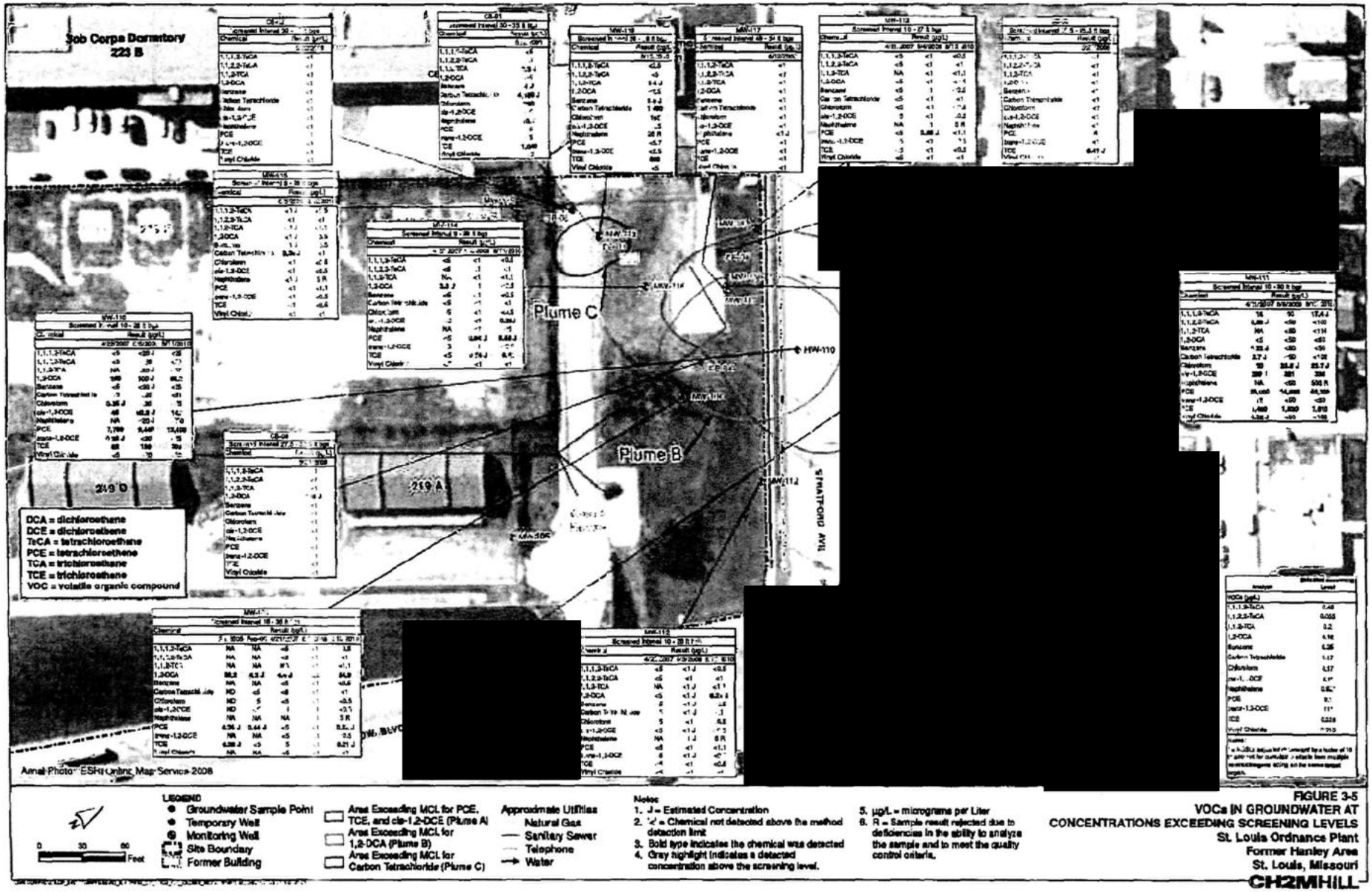


**FIGURE 3-5**
**VOCs IN GROUNDWATER AT CONCENTRATIONS EXCEEDING SCREENING LEVELS**
**St. Louis Ordnance Plant**
**Former Hanley Area**
**St. Louis, Missouri**
**CH2MHILL**

**Field Groundwater Quality Parameters**
**Former Hanley Area, St. Louis Ordnance Plant, St. Louis, MO**
**August 2010**

| | Water Quality Parameters Measured During Purging - August 2010 | | | | | | | | | | Summary Information | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well Name | Begin / End Purge | Time | Volume Removed (liters) | pH | Specific Conductance (mS/cm) | Temperature (degrees C) | Redox (mV) | Depth to Water (ft below top of casing) | D.O. (mg/L) | Turbidity (NTU) | Well Name | Elapsed Purge Time (minutes) | Volume Purged (liters) | Purge Rate (L/min) | Purge Rate (gal/min) | Drawdown in 2-inch diameter well[1] (ft) | Specific Conductance (mS/cm) |
| MW-106 | Begin | 7:31 | 0.00 | 6.77 | 0.714 | 16.68 | 217.8 | 10.11 | 3.73 | 1.43 | | | | | | | |
| MW-106 | End | 7:56 | 3.75 | 6.32 | 0.699 | 16.06 | 236.3 | 12.64 | 3.06 | 0.64 | MW-106 | 25 | 3.75 | 0.15 | 0.040 | 2.53 | 0.699 |
| MW-107 | Begin | 14:24 | 0.00 | 6.66 | 0.919 | 22.97 | 104.9 | 3.31 | 7.88 | 2.68 | | | | | | | |
| MW-107 | End | 14:44 | 4.00 | 6.30 | 0.884 | 22.23 | 125.6 | 6.14 | 6.77 | 2.07 | MW-107 | 20 | 4.00 | 0.20 | 0.053 | 2.83 | 0.884 |
| MW-108 | Begin | 10:31 | 0.00 | 6.73 | 0.930 | 21.46 | 196.5 | 2.71 | 2.01 | 1.95 | | | | | | | |
| MW-108 | End | 11:16 | 7.13 | 5.88 | 0.921 | 20.52 | 383.2 | 6.1 | 2.01 | 1.67 | MW-108 | 45 | 7.13 | 0.16 | 0.042 | 3.39 | 0.921 |
| MW-109 | Begin | 12:09 | 0.00 | 5.99 | 0.607 | 21.55 | 106.3 | 4.02 | 1.85 | 32.00 | | | | | | | |
| MW-109 | End | 12:34 | 4.38 | 5.16 | 0.596 | 21.41 | 218.7 | 5.32 | 1.82 | 28.50 | MW-109 | 25 | 4.38 | 0.17 | 0.046 | 1.30 | 0.596 |
| MW-110 | Begin | 11:55 | 0.00 | 6.56 | 0.716 | 23.04 | 74.8 | 1.82 | 6.76 | 5.43 | | | | | | | |
| MW-110 | End | 12:20 | 5.00 | 6.37 | 0.697 | 21.94 | 130.4 | 4.46 | 5.64 | 1.77 | MW-110 | 25 | 5.00 | 0.20 | 0.053 | 2.64 | 0.697 |
| MW-111 | Begin | 8:48 | 0.00 | 6.17 | 0.628 | 19.78 | 278.5 | 5.16 | 1.73 | 6.20 | | | | | | | |
| MW-111 | End | 9:18 | 6.00 | 5.01 | 0.620 | 19.38 | 451.9 | 9.98 | 1.24 | 3.29 | MW-111 | 30 | 6.00 | 0.20 | 0.053 | 4.82 | 0.620 |
| MW-112 | Begin | 7:23 | 0.00 | 6.29 | 0.718 | 18.67 | 195 | 2.41 | 1.49 | 9.04 | | | | | | | |
| MW-112 | End | 7:58 | 6.00 | 5.80 | 0.692 | 18.31 | 378.8 | 6.58 | 1.04 | 1.75 | MW-112 | 35 | 6.00 | 0.17 | 0.045 | 4.17 | 0.692 |
| MW-113 | Begin | 8:50 | 0.00 | 5.69 | 0.672 | 19.23 | 235.2 | 2.32 | 1.66 | 7.87 | | | | | | | |
| MW-113 | End | 9:40 | 8.75 | 4.98 | 0.662 | 18.98 | 298.8 | 7.35 | 1.14 | 3.42 | MW-113 | 50 | 8.75 | 0.18 | 0.046 | 5.03 | 0.662 |
| MW-114 | Begin | 8:41 | 0.00 | 7.08 | 0.554 | 18.56 | 145.8 | 4.48 | 1.9 | 1.28 | | | | | | | |
| MW-114 | End | 9:46 | 8.19 | 5.61 | 0.467 | 18.71 | 287.9 | 8.94 | 1.16 | 0.97 | MW-114 | 65 | 8.19 | 0.13 | 0.033 | 4.46 | 0.467 |
| MW-115 | Begin | 9:11 | 0.00 | 7.84 | 0.357 | 18.34 | 167.7 | 24.8 | 7.15 | 2.86 | | | | | | | |
| MW-115 | End | 9:36 | 3.75 | 8.11 | 0.320 | 19.46 | 170.2 | 26.72 | 7.93 | 0.99 | MW-115 | 25 | 3.75 | 0.15 | 0.040 | 1.92 | 0.320 |
| MW-116 | Begin | 14:18 | 0.00 | 6.01 | 1.329 | 19.37 | 76.2 | 4.58 | 2.41 | 2.66 | | | | | | | |
| MW-116 | End | 14:38 | 4.00 | 5.79 | 1.366 | 19.31 | 98.7 | 8.2 | 2.14 | 6.51 | MW-116 | 20 | 4.00 | 0.20 | 0.053 | 3.62 | 1.366 |

[1] - Monitoring well depths range from 27 to 43 feet below ground surface